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ABSTRACT

This paper focuses on the discrepancy in the access and use of computers by girls and boys in early childhood classrooms. It is argued that this difference can be attributed to gender biased classroom practices, lack of female role models, and the unavailability of bias-free software programs. The paper: discusses existing forms of gender bias; emphasizes the importance of providing boys and girls equal opportunities in computer use; suggests ways to increase teachers' awareness of the sex role stereotyping and gender-biased use of computers, and recommends strategies to deal with those biases; and provides criteria in the selection of bias-free software programs. Contains 30 references. (KB)

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Moving Towards the 21st Century: Eliminating Gender Biases in Young Children's use of Computers

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This paper focuses on the discrepancy that exists with regard to the access and use of computers between girls and boys in early childhood classrooms. It is argued that this difference can be attributed to gender biased classroom practices, lack of female role models and the unavailability of bias-free software programs. The purpose of this paper is to:

- Discuss the existing forms of gender bias
- Emphasize the importance of providing boys and girls equal opportunities in the use of computers
- Suggest ways to increase teachers' awareness of the sex role stereotyping and gender biased use of computers and recommend strategies to deal with those biases
- Provide criteria in the selection of bias free software programs

In the 1980s it was believed that gender bias existed with regard to computer use. It was, however, also believed that as computers became a routine piece of equipment in every classroom, and class projects involved the use of computers, this bias would finally diminish. The computer, according to Watt (1984) was seen as the great equalizer. If children were exposed to computers early enough, and if schools maintained equal access through computing, girls would become competent computer users. Current data,

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however suggests that males are still the predominant users of this technology (Durnell, 1995). According to Shashaani (1994), while there was an increase in the number of women who earned degrees in computer science and related courses in the 80s, these numbers have been steadily declining.

Research reveals that young girls are not using computers and are thus not as computer literate as their male counterparts. Beginning in the preschool years males spend consistently more time at computer related activities (Nelson & Watson, 1991). According to Bakon, Neilson & Mckenzie (1983) the gap between girls and boys in math and science classes is being replicated in computer labs as well. Although the number of computers in schools has increased, analysis of computer access and usage patterns suggest that socioeconomic patterns, ethnicity and gender determine who uses computers and how they are used (Mangione, 1995).

The National Association for the Education of Young Children's position statement on Technology and Young Children (1996) supports the need for equal access to technology for all children and requires that attention be paid to eliminating gender stereotypes. According to Kramer (1988), Derman-Sparks (1989) & Fagot (1994), by the age of four, children are strongly influenced by societal norms for gender behavior. They thus participate in different activities and accept the idea that girls and boys are supposed to behave differently. In some instances societal norms may even override children's own first hand experience. The goals for preschool children while learning about and dealing with gender equity are to free them from constraining, stereotypic definitions of gender roles and to develop their skills for challenging sexist stereotypes and behavior

(Derman-Sparks,1989). Adults need to enhance the self concept of girls in relation to computers and introduce computer literacy early before gender stereotypes emerge.

The role of teachers and parents in breaking the pattern of establishing sexist stereotypes and behaviors in young children is crucial. Increasing teacher and parent awareness of gender bias with regard to computer usage will facilitate the initiation of necessary changes. For the changes to be successful, it is essential to provide young children with positive experiences before biases have set in. There are three aspects of this bias that have been identified (Nelson & Watson, 1991).

These biases relate to:

- Attitudes of girls towards computers
- Biased adult (both teachers and parents) expectations and attitude towards computer use by girls
- Biases in the software programs that are available

Biased attitude of girls towards computers and their use and strategies to deal with those biases

Studies have indicated that girls believe computers and technology to be beyond their capabilities and realm of understanding. The association of computers with mathematical abilities leads to the attitude that since boys have demonstrated better performance in math, they would likewise be better at computing. Schofield (1995), indicates that girls are much less likely to be found in computer classrooms than their male counterparts.

The relationship between positive experience and future interests and attitudes is obvious. Shashaani (1994), Chen (1986), and Loyd and Gressard (1984), found that

differential computer experiences accounted for differences in attitudes more so than does gender. Boys showed more positive attitude towards computers than girls, however boys also attended more computer classes, used computers more often and had greater access to computers in the home. The more time a child spends on a computer, the more positively computer experiences are rated (Chen, 1986 and Muira & Hess, 1985).

The experiences that girls have with computers are very different than those of their male peers. According to Schofield, (1995), social arrangements and educational practices (e.g. lack of female role models, decisions about content and location, gender stereotyped course material etc.) discourage many girls from seeking out opportunities to use computers and thus create a less positive attitude towards computing. This affects the way computers are taught, where they are located and the way they are used (Mangione, 1995). Edwards (1984) provisdes an example of quantitative inequality wherein computers are placed in advanced math and gifted classes; classes in which girls are often under-represented.

A change in attitude is necessary in order to ensure that girls are not deprived of educational and professional opportunities and advancement in the future. According to Hawkins (1985), there exists not only a problem of equity with regard to the access and use of computers but also one of a lack of support to girls and women with regard to learning with computers. Bakon et al. (1983) and Marrapodi (1984) suggest that a combination of aggressive affirmative action strategies as well a strong support network are essential to make girls comfortable and competent in this technological world. Sanders & Stone(1986) emphasize the importance of using the computer as a tool as opposed to an object of study. They also recommend computer activities that encourage

"group learning, social interaction and cooperative problem solving" (p. 26). These correspond more effectively to girls' way of earning.

The goal is not only to make the computer more accessible and attractive to girls than to boys, but to ensure that this tool is available to all students in the schools (Fisher, 1984). Both girls and boys must have equitable computer opportunities.

The strategies for changing attitudes of girls towards computers include :

- Providing students with female role models who are competent users of this technology
- Introducing computers early (before societal norms for gender behavior become ingrained) as tools that both women and men use
- Working with students to promote competence and confidence with new software
- Ensuring that computer software and other classroom materials are bias free

Adult biased attitudes and expectations and strategies to deal with those biases

It has been documented that teachers often defer computer handling to the male students and thus suggest to the females that they are not needed, or wanted near computers, and that they definitely cannot contribute. The differential treatment of girls and boys in schools has resulted in significantly different educational experiences in terms of teacher interactions, curriculum needs and an unmistakable male bias in the culture of the school (Cushner et al., 1992). It is therefore not surprising that while girls start out ahead in a variety of abilities particularly verbal ability, eye-hand coordination and mathematical ability, by seventh grade they fall behind boys and lose interest in science and math. A number of studies have found that the same pattern is being

replicated as far as computer technology is concerned (Shashaani, 1994, Koch, 1994, Nelson & Watson, 1991).

This computer gender gap seems to exist in homes, schools as well as in summer camps. Research indicates that twice as many girls as boys used their home computers, and that boys, even at the preschool age, use them for longer periods of time than girls (Shashaani, 1994; Nelson & Watson, 1991; Miura & Hess, 1985; Miura & Hess, 1983; Fisher,1984). This may reflect both the levels of interests vis-à-vis computers (of boys and girls) as well as "parents willingness to pay for computer enrichment experiences for their sons as opposed to their daughters" (Sanders & Stone, 1986, p. 6). The actions of parents and society demonstrate to girls that computers are not for them (Gilliland, 1984). However, research suggests that young girls' attitudes are more positive when their mothers use computers (Colley, Gale, & Harris, 1994).

The strategies for modifying teacher and parent attitudes and expectations include:

- Monitoring the use of computers in the classroom continuously and consciously
- Establishing schedules for computer use and assigning both girls and boys to computer related activities
- Setting high expectations and highlight the capabilities of all students with regard to computer use
- Encouraging computer use in pairs or in small groups
- Integrating the use of computers in a variety of ways into the curriculum
- Educating parents to be sensitive to gender bias with regard to the use of computers

Bias in computer software and criteria for selecting anti-bias software programs

Software is often "designed for boys, about boys and by boys" (Campbell, 1984, p.5). A majority of the software available is designed with a male perspective and tends to be game-oriented (Mangione, 1995). Even educational software programs are designed with male characteristics. The lack of computer application skills for girls that focus on "group learning and cooperative problem solving" (Sanders & Stone, 1986, p.26) have further prejudiced girls' use and attitudes towards computers.

According to Hodes (1995) and Biraimah (1989) results from evaluating computer software programs indicate that a majority of the main characters were gender identifiable, and of these the large percentage were male. In addition females were represented mainly in traditional roles, while high status positions and active roles were assigned to males. Ware & Struck (1985) explored the representation of male and females in computer magazines and found that the portrayals were extremely gender stereotypical. According to Calvert (1999), Continuous exposure to gender stereotypes through computer interactions reinforces the schemas that computers are for males. "If young children learn to define technology as gender inappropriate, they are less likely to be interested in it and motivated to use it" (p. 71).

Research also indicates that even when software programs use androgynous figures, children particularly boys, tend to assign a male gender to the "neutral" figures (Bradshaw, Clegg & Trayhurn, 1995). Very young children have limited classification skills and their beliefs about gender stereotypes are determined by their experiences and are often very rigid.

The criteria for selecting software are content, characters and rewards related.

Content related criteria include:

- Frequency of aggressive or destructive behavior
- Emotional statements attributed to females vs. males
- Theme s and overall styles that appeal to both girls and boys
- Limited sexist language

Character related criteria include:

- Presence of an equal number of female and male characters
- Non traditional/anti-stereotypic representation by occupational roles
- Intense physical action that is assigned to both female and male roles
- Female characters portrayed in problem solving situations

Rewards related criteria:

- Rewards include both words and graphics
- Rewards for correct answers or program are oriented to both females and males
- Program allows a choice of the reward system

In order for changes in attitudes and behaviors to occur, intervention research aimed at the development of programs using the aforementioned teaching strategies and techniques need to be conducted. Such research endeavors should attempt to empower three groups of females, young girls, their teachers (predominantly females) and their parents (especially their mothers). Teachers need to become central players in this process of change working both with children and their parents. As teachers become confident users of computers they will serve as positive role models for their students. In addition, teachers' increased awareness of gender biased classroom practices and

systematic use of strategies in dealing with theses biases will provide equal access to computers in school. To ensure young children's equal access to computers outside of school, teachers need to actively engage parents in classroom activities involving the use of computers and educate them regarding the long-term ramifications of biased attitudes and behaviors.

A proactive approach in dealing with young children's use of computers will ensure that they develop positive attitudes towards computers before gender stereotypic behaviors have been established. Computers are not inherently biased, yet in the contexts in which they are used they often take on characteristics that reinforce gender bias. As the cycle of bias is perpetuated girls become less capable of realizing their potential. Since gender stereotyping is well established by the age of four, it becomes increasingly important to provide opportunities for non-sexist thinking and behaving when children are very young and before stereotypic roles become crystallized.

Gender equity is more than just treating girls and boys equally. It has to do with eliminating/reducing the attitudes and expectations that imply that any one gender is inferior or superior to the other. Such changes in attitude will contribute to the advantage of both girls and boys. As computers become an integral part of our lives it is essential that we consider the issue of equity particularly because of its educational, social, economic and political impact. With the projected need for female scientist tripling during the next century and increasing job openings for computer engineers and systems analysts it is our responsibility to prepare children to meet the challenges of the 21st Century.

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